



Secretariat

Distr.
GENERAL

ST/SG/AC.10/C.3/30/Add.2
24 July 1998

Original: ENGLISH

COMMITTEE OF EXPERTS ON THE
TRANSPORT OF DANGEROUS GOODS

Sub-Committee of Experts on the
Transport of Dangerous Goods
(Fifteenth session,
Geneva, 29 June-9 July 1998)

REPORT OF THE SUB-COMMITTEE OF EXPERTS
ON ITS FIFTEENTH SESSION

(Geneva 29 June-9 July 1998)

Addendum 2

1. Draft amendments to the Model Regulations annexed to the tenth revised edition of the United Nations Recommendations on the Transport of Dangerous Goods (ST/SG/AC.10/1/Rev.10) pages 2-19
2. Draft amendments to the Manual of Tests and Criteria (ST/SG/AC.10/11/Rev.2) pages 20-33

1. **DRAFT AMENDMENTS TO THE MODEL REGULATIONS ANNEXED TO THE TENTH REVISED EDITION OF THE UNITED NATIONS RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS**
(Refer to ST/SG/AC.10/1/Rev.10)

TABLE OF CONTENTS

Amend the table of contents to reflect to the various parts of the Model Regulations, as appropriate.

Chapter 1.2

- 1.2.1 Add the following definition of Liner:

"Liner means a separate tube or bag inserted into a packaging, large packaging or IBC but not forming an integral part of it, including the closures of its openings."

Chapter 2.0

- 2.0.4.1 Add at the end (see ST/SG/AC.10/C.3/26/Add.2) the following new sentence:

"When an N.O.S. entry is used to transport the sample, the proper shipping name need not be supplemented with the technical name as required by special provision 274."

Chapter 2.4

- 2.4.2.3.2.4 Add the following new entry:

SELF-REACTIVE SUBSTANCE	Concentration (%)	Packing method	Control temperature (°C)	Emergency temperature (°C)	UN generic entry	Remark
2,2'-AZODI(ISOBUTYRONITRILE) as a water based paste	≤ 50%	OP6			3224	

Chapter 2.5

- 2.5.3.2.4 Replace "+10" by "+15" in the column headed "Control Temperature (°C)" and "+15" by "+20" in the column headed "Emergency temperature (°C)" for the entry "tert-BUTYL PEROXY-2-ETHYLHEXANOATE (in tanks)".

Replace "-5" by "+5" in the column headed "Control Temperature (°C)" and "+5" by "+10" in the column headed "Emergency Temperature (°C)" for the entry "tert-BUTYL PEROXYPIVALATE (in tanks)".

Replace "-10" by "0" in the column headed "Control Temperature (°C)" and "0" by "+5" in the column headed "Emergency Temperature (°C)" for the entry "Di-(3,5,5-TRIMETHYLHEXANOYL) PEROXIDE (in tanks)".

Replace " ≤ 42 " by " ≤ 52 " in the column headed "Concentration (%)" for the third entry for "tert-BUTYL PEROXYNEODECANOATE".

Replace "OP8,M" by "OP8,N,M" in the column headed "Packing Method" for the last entry for "tert-BUTYL HYDROPEROXIDE".

Replace "OP8" by "OP8,N" in the column headed "Packing Method" and "3117" by "3119" in the column headed "Number (Generic entry)" for the last entry for "DI-(3,5,5-TRIMETHYLHEXANOYL) PEROXIDE".

Replace "OP8" by "OP8,N" in the column headed "Packing Method" for the second entry for "2,4,4-TRIMETHYLPENTYL-2-PEROXYNEODECANOATE".

Replace "OP7" by "OP5" in the column headed "Packing Method" and "3115" by "3113" in the column headed "Number (Generic entry)" for the entry for "2,5-DIMETHYL-2,5-DI-(2-ETHYLHEXANOYLPEROXY)HEXANE".

Replace "-10" by "-20" in the column headed "Control Temperature (°C)" and "0" by "-10" in column headed "Emergency Temperature (°C)" for the second entry for "DIISOPROPYL PEROXYDICARBONATE".

Replace "+5" by "0" in the column headed "Control Temperature (°C)" for the second entry for "tert-BUTYL PEROXYNEOHEPTANOATE".

Replace "+10" by "-10" in the column headed "Control Temperature (°C)" for the second entry for "CUMYL PEROXYNEOHEPTANOATE".

Delete ">28" in the column headed "Diluent type B (% 1)" and add ">28" in the column headed "Diluent type A (%)" for the second entry for "CYCLOHEXANONE PEROXIDE(S)".

Add ">23" in the column headed "Diluent type B (% 1)" for the second entry for "DI-(2-ETHYLHEXYL) PEROXYDICARBONATE".

Replace "+25" by "+20" in the column headed "Emergency Temperature (°C)" for the entry for "DIMYRISTYL PEROXYDICARBONATE (in IBCs)".

Add "3)" in the column headed "Subsidiary risks and remarks" for the second entry for "ISOPROPYL sec-BUTYL PEROXYDICARBONATE + DI-sec-BUTYL PEROXYDICARBONATE + DI-ISOPROPYL PEROXYDICARBONATE".

Wherever it appears in the column headed "ORGANIC PEROXIDE", amend the name of "1,1-DI-(tert-BUTYLPEROXY)-3,5,5-TRIMETHYLCYCLOHEXANE" to read:

"1,1-DI-(tert-BUTYLPEROXY)-3,3,5-TRIMETHYLCYCLOHEXANE"

Wherever it appears in the column headed "ORGANIC PEROXIDE", amend the name of "2,4,4-TRIMETHYLPENTYL-2-PEROXYNEODECANOATE" to read:

"1,1,3,3-TETRAMETHYLBUTYL PEROXYNEODECANOATE"

Wherever it appears in the column headed "ORGANIC PEROXIDE", amend the name of "2,4,4-TRIMETHYLPENTYL-2-PEROXYPHENOXYACETATE" to read:

"1,1,3,3-TETRAMETHYLBUTYL PEROXYPHENOXYACETATE"

Under "Notes on 2.5.3.2.4:", add a new note 28) to read as follows:

"28) *Available active oxygen* $\leq$ 7.6%."

3.2.4 Add the following new entries:

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B (%) I)	Inert solid (%)	Water (%)	Packing Method	Control Temperature (°C)	Emergency Temperature (°C)	Number (Generic entry)	Subsidiary risks and remarks
(2-ETHOXYETHYL) PEROXYDICARBONATE	≤ 52		≥ 48			OP7	-10	0	3115	
HEXYL PEROXYPIVALATE	≤ 72		≥ 28			OP7	+10	+15	3115	
(3-METHOXYBUTYL) PEROXYDICARBONATE	≤ 52		≥ 48			OP7	-5	+5	3115	
(3-(3-METHYLBENZOYL) PEROXIDE + BENZOYL (3-METHYLBENZOYL) PEROXIDE + BENZOYL PEROXIDE	≤ 20+≤ 18+≤ 4		≥ 58			OP7	+35	+40	3115	
(2-ETHYLHEXYL) PEROXYDICARBONATE	≤ 62 as a stable dispersion in water					OP8	-15	-5	3117	
DI-(4,4-DI-(tert-BUTYL)PEROXY CLOHEXYL) PROPANE	≤ 22		≥ 78			OP8			3107	
HEXYL PEROXYNEODECANOATE	≤ 71	≥ 29				OP7	0	+10	3115	
DI-(tert-BUTYLPEROXY)-3,3,5-METHYLCYCLOHEXANE	≤ 77		≥ 23			OP7			3105	
9-TRIETHYL-3,6,9-TRIMETHYL 4,7-TRIPEROXONANE	≤ 42	≥ 58				OP7			3105	28)
BUTYL PEROXYNEODECANOATE	≤ 32	≥ 68				OP8,N	0	+10	3119	
BUTYL PEROXYNEODECANOATE (IBC ₅)	≤ 42 as a stable dispersion in water					N	-5	+5	3119	

ANIC PEROXIDE	Concen- tration (%)	Diluent type A (%)	Diluent type B (% I)	Inert solid (%)	Water (%)	Packing Method	Control Tempera- ture (°C)	Emergency Tempera- ture (°C)	Number (Generic entry)	Subsidiary risks and remarks
YL PEROXYNEODECANOATE (in IBCs)	≤52 as a stable dispersion in water					N	-15	-5	3119	
2-ETHYLHEXYL) PEROXYDICARBONATE (IBC)	≤52 as a stable dispersion in water					N	-20	-10	3119	
DIMETHYL-2,5-DI- t-BUTYLPEROXY)HEXANE	≤77			≥23		OP8			3108	
DIMETHYL-2,5-DI- t-BUTYLPEROXY)HEXYNE-3	>86-100					OP5			3101	3)
HYL ETHYL KETONE PEROXIDE(S)	≤37	≥55			≥8	OP7			3105	9)

Amend the following entries to read:

ANIC PEROXIDE	Concen- tration (%)	Diluent type A (%)	Diluent type B (% I)	Inert solid (%)	Water (%)	Packing Method	Control Tempera- ture (°C)	Emergency Tempera- ture (°C)	Number (Generic entry)	Subsidiary risks and remarks
-AMYL PEROXYBENZOATE	≤100					OP5			3103	
-PROPYL PEROXYDICARBONATE	≤100					OP3	-25	-15	3113	
	≤77		≥23			OP5	-20	-10	3113	

Chapter 2.6**2.6.3.1.3(b) Amend to read:**

"(b) Those where a relatively low probability exists that pathogens of risk groups 2 or 3 are present. Specimens transported for the purpose of initial diagnosis for other than the presence of pathogens or specimens transported for routine screening tests fall within this Group;"

Chapter 3.2**DANGEROUS GOODS LIST****1. Add the following amendments:**

UN 1408 Replace Special Provision "40" by "223" in column 6.

UN 2530 Delete.

UN 3090 Insert special provision "286" in column 6.

UN 3268 Insert special provision "288" in column 6.

UN 3353 Insert special provision "288" in column 6.

2. Add the following new entries:

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
0501	ROCKETS with inert head	1.2C				NONE	130			
0502	AIR BAG INFLATORS, PYROTECHNIC or AIR BAG MODULES, PYROTECHNIC or SEAT- BELT PRETENSIONERS, PYROTECHNIC	1.4G			288	NONE	135			
0503	1H-TETRAZOLE	1.1D		II			112(c)			
3357	NITROGLYCERIN MIXTURE, DESENSITIZED, LIQUID, N.O.S. with not more than 30% nitroglycerin, by mass	3		II	109, 274, 287					

Chapter 3.3

SP40 Delete.

SP188(a) Amend to read as follows:

- "(a) For a cell with a liquid cathode, the lithium content of the anode, when fully charged, is not more than 0.5 g, and for a cell with a solid cathode, the lithium content of the anode, when fully charged, is not more than 1 g;"
- (b) Amend to read as follows:
- "(b) For a battery with liquid cathodes, the aggregate lithium content of the anodes, when fully charged, is not more than 1 g, and for a battery with solid cathodes, the aggregate lithium content of the anodes, when fully charged, is not more than 2 g;"
- (f) Amend the beginning to read as follows:
- "(f) If, when fully charged, the aggregate lithium content of the anodes in a liquid cathode battery is more than 0.5 g, or of the aggregate lithium content of the anodes in a solid cathode battery is more than 1 g, it does not contain a liquid or gas..." [remainder unchanged].
- (g) Amend to read as follows:
- "(g) The lithium content of the anode of each cell, when fully charged, is not more than 5 g;"
- (h) Amend to read as follows:
- "(h) The aggregate lithium content of the anodes of each battery, when fully charged, is not more than 25 g;"

SP230 Add a new first sentence to read:

"This entry applies to cells and batteries containing lithium in any form, including lithium polymer and lithium ion cells and batteries."

Delete (b) and (c), and renumber consequently.

Amend existing sub-paragraph (f) (new (d)) to read as follows:

- "(d) Each battery containing cells or series of cells connected in parallel is equipped with effective means as necessary to prevent dangerous reverse current flow (e.g., diodes, fuses, etc.);"

SP235 Delete the last sentence.

SP240 Replace "or sodium batteries" by ".sodium batteries or lithium batteries".

SP280 Delete the last sentence.

SP283 Amend to read as follows:

"283 Articles, containing gas, intended to function as shock absorbers, including impact energy-absorbing devices, or pneumatic springs are not subject to these Model Regulations provided each article:

- (a) Has a gas space capacity not exceeding 1.6 litres and a charge pressure not exceeding 280 bar where the product of the capacity (litres) and charge pressure (bars) does not exceed 80 (i.e 0.5 litre gas space and 160 bar charge pressure, 1 litre gas space and 80 bar charge pressure, 1.6 litre gas space and 50 bar charge pressure, 0.28 litre gas space and 280 bar charge pressure) ;
- (b) Has a minimum burst pressure of 4 times the charge pressure at 20 °C for products not exceeding 0.5 litre gas space capacity and 5 times charge pressure for products greater than 0.5 litre gas space capacity;
- (c) Is manufactured from material which will not fragment upon rupture;
- (d) Is manufactured in accordance with a quality assurance standard acceptable to the competent authority, and
- (e) The design type has been subjected to a fire test demonstrating that the article relieves its pressure by means of a fire degradable seal or other pressure relief device, such that the article will not fragment and that the article does not rocket."

SP286 Add the following new special provision:

"286 New, uncycled and uncharged lithium ion cells and batteries are not subject to these Regulations if:

- (a) The electrolyte does not meet the definition of any class or division in these Regulations; or
- (b) If the electrolyte meets the definition of a hazard class or division in these Regulations, the electrolyte will not flow from a ruptured or cracked case and there is no free liquid to flow."

SP287 Add the following new special provision:

"287 These substances shall not be classified and transported unless authorized by the competent authority on the basis of results from Series 2 tests and a Series 6(c) test on packages as prepared for transport (see 2.1.3.1)."

SP288 Add the following new special provision:

"288 Air bags or seat-belts installed in vehicles or in completed vehicle components such as steering columns, door panels, seats etc. are not subject to these Regulations."

Chapter 4.1

Title Add "AND LARGE PACKAGINGS" at the end.

Introductory notes

Note 1 Amend to read:

"Dangerous goods of all classes other than Classes 1, 2, and 7, divisions 5.2 and 6.2 and the self-reactive substances of division 4.1 have for packing purposes been assigned to three packing groups in accordance with the degree of danger they present, i.e."

*Packing group I: Substances or articles presenting high danger;
Packing group II: Substances or articles presenting medium danger; and
Packing group III: Substances or articles presenting low danger."*

Note 2 Add ", including IBCs and large packagings" after "packagings", delete "category" at the end and add "group" after "danger".

4.1.1 Replace this section with the following:

"4.1.1 General provisions for the packing of dangerous goods, other than goods of Classes 2 or 7 or Division 6.2, in packagings, including IBCs and large packagings.

4.1.1.1 Dangerous goods shall be packed in good quality packagings, including IBCs and large packagings, which shall be strong enough to withstand the shocks and loadings normally encountered during transport, including trans-shipment between transport units and/or warehouses as well as any removal from a pallet or overpack for subsequent manual or mechanical handling. Packagings, including IBCs and large packagings, shall be constructed and closed so as to prevent any loss of contents when prepared for transport which might be caused under normal conditions of transport, by vibration, or by changes in temperature, humidity or pressure (resulting from altitude, for example). No dangerous residue shall adhere to the outside of packages, IBCs and large packagings during transport. These provisions apply to new, reused, reconditioned or remanufactured packagings, including IBCs and large packagings, as appropriate.

4.1.1.2 Parts of packagings, including IBCs and large packagings, which are in direct contact with dangerous goods

(a) Shall not be affected or significantly weakened by those dangerous goods, and

- (b) Shall not cause a dangerous effect e.g. catalysing a reaction or reacting with the dangerous goods.

Where necessary, they shall be provided with a suitable inner coating or treatment.

4.1.1.3 Unless provided elsewhere in these Regulations, each packaging, including IBCs and large packagings - except inner packagings of combination packagings - shall conform to a design type successfully tested in accordance with the requirements of 6.1.5, 6.5.4 or 6.6.5, respectively.

4.1.1.4 When filling packagings, including IBCs and large packagings, with liquids, sufficient ullage (outage) shall be left to ensure that neither leakage nor permanent distortion of the packaging occurs as a result of an expansion of the liquid caused by temperatures likely to occur during transport. Unless specific requirements are prescribed in national or international rules, agreements or recommendations, liquids shall not completely fill a packaging at a temperature of 55 °C. However sufficient ullage shall be left in an IBC to ensure that at the mean bulk temperature of 50 °C it is not filled to more than 98% of its water capacity.

4.1.1.4.1 For air transport, packagings intended to contain liquids shall also be capable of withstanding a pressure differential without leakage as specified in the international regulations for air transport.

4.1.1.5 Inner packagings shall be packed in an outer packaging in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the outer packaging. Inner packagings that are liable to break or be punctured easily, such as those made of glass, porcelain or stoneware or of certain plastics materials, etc., shall be secured in outer packagings with suitable cushioning material. Any leakage of the contents shall not substantially impair the protective properties of the cushioning material or of the outer packaging.

4.1.1.6 Dangerous goods shall not be packed together in the same outer packaging or in large packagings with dangerous or other goods if they react dangerously with each other and cause:

- (a) combustion and/or evolution of considerable heat;
- (b) evolution of flammable, toxic or asphyxiant gases;
- (c) the formation of corrosive substances; or
- (d) the formation of unstable substances.

4.1.1.7 The closures of packagings containing wetted or diluted substances shall be such that the percentage of liquid (water, solvent or phlegmatizer) does not fall below the prescribed limits during transport.

4.1.1.7.1 Where two or more closure systems are fitted in series on an IBC, that nearest to the substance being carried shall be closed first.

4.1.1.8 Where pressure may develop in a package by the emission of gas from the contents (as a result of temperature increase or other cause), the packaging may be fitted with a vent, provided that the gas emitted will not cause danger on account of its toxicity, its flammability, the quantity released, etc. The vent shall be so designed that, when the packaging is in the attitude in which it is intended to be transported, leakages of liquid and the penetration of foreign matter are prevented under normal conditions of transport. Venting of the package is not permitted for air transport.

4.1.1.9 New, remanufactured or reused packagings, including IBCs and large packagings, or reconditioned packagings and repaired IBCs shall be capable of passing the tests prescribed in 6.1.5, 6.5.4 and 6.6.5, respectively. Before being filled and handed over for transport, every packaging, including IBCs and large packagings, shall be inspected to ensure that it is free from corrosion, contamination or other damage and every IBC shall be inspected with regard to the proper functioning of any service equipment. Any packaging, which shows signs of reduced strength as compared with the approved design type shall no longer be used or shall be so reconditioned, that it is able to withstand the design type tests. Any IBC which shows signs of reduced strength as compared with the tested design type shall no longer be used or shall be so reconditioned that it is able to withstand the design type tests.

4.1.1.10 Liquids shall be filled only into packagings, including IBCs, which have an appropriate resistance to the internal pressure that may develop under normal conditions of transport. Packagings and IBCs marked with the hydraulic test pressure prescribed in 6.1.3.1(d) and 6.5.2.2.1, respectively shall be filled only with a liquid having a vapour pressure:

- (a) Such that the total gauge pressure in the packaging or IBC (i.e. the vapour pressure of the filling substance plus the partial pressure of air or other inert gases, less 100 kPa) at 55 °C, determined on the basis of a maximum degree of filling in accordance with 4.1.1.4 and a filling temperature of 15 °C, will not exceed two thirds of the marked test pressure, or
- (b) At 50 °C less than four sevenths of the sum of the marked test pressure plus 100 kPa; or
- (c) At 55 °C less than two thirds of the sum of the marked test pressure plus 100 kPa.

Metal IBCs intended for the carriage of liquids shall not be used to carry liquids having a vapour pressure of more than 110kPa (1.1 bar) at 50 °C or 130kPa (1.3 bar) at 55 °C.

EXAMPLES OF REQUIRED MARKED TEST PRESSURES FOR PACKAGINGS, INCLUDING IBCs, CALCULATED AS IN 4.1.1.10 (c)

UN No.	Name	Class	Packing Group	V_{ps} (kPa)	$V_{ps} \times 1.5$ (kPa)	$(V_{ps} \times 1.5)$ minus 100 (kPa)	Required minimum test pressure gauge under 6.1.5.5.4.(c) (kPa)	Minimum test pressure (gauge) to be marked on the packaging (kPa)
2056	Tetrahydrofuran	3	II	70	105	5	100	100
2247	n-Decane	3	III	1.4	2.1	-97.9	100	100
1593	Dichloromethane	6.1	III	164	246	146	146	150
1155	Diethyl ether	3	I	100	299	199	199	250

Note 1: For pure liquids the vapour pressure at 55 °C (V_{ps}) can often be obtained from scientific tables.

Note 2: The table refers to the use of 4.1.1.10 (c) only, which means that the marked test pressure shall exceed 1.5 times the vapour pressure at 55 °C less 100 kPa. When, for example, the test pressure for n-decane is determined according to 6.1.5.5.4 (a), the minimum marked test pressure may be lower.

Note 3: For diethyl ether the required minimum test pressure under 6.1.5.5.5 is 250 kPa.

4.1.1.11 Empty packagings, including IBCs and large packagings, that have contained a dangerous substance shall be treated in the same manner as is required by these Regulations for a filled packaging, unless adequate measures have been taken to nullify any hazard.

4.1.1.12 Every packaging and IBC intended to contain liquids shall successfully undergo a suitable leakproofness test, and be capable of meeting the appropriate test level indicated in 6.1.5.4.3, or 6.5.4.7 for the various types of IBCs:

- (a) Before it is first used for transport;
- (b) After remanufacturing or reconditioning of any packaging, before it is re-used for transport;
- (c) After the repair of any IBC, before it is re-used for transport.

For this test the packaging, or IBC, need not have its closures fitted. The inner receptacle of a composite packaging or IBC may be tested without the outer packaging, provided the test results are not affected. This test is not necessary for inner packagings of combination packagings.

4.1.1.13 Packagings, including IBCs, used for solids which may become liquid at temperatures likely to be encountered during transport shall also be capable of containing the substance in the liquid state.

4.1.1.14 Packagings, including IBCs, used for powdery or granular substances shall be siftproof or shall be provided with a liner.

4.1.1.15 Use of salvage packagings

4.1.1.15.1 Damaged, defective or leaking packages, or dangerous goods that have spilled or leaked may be transported in salvage packagings mentioned in 6.1.5.1.11. This does not prevent the use of a bigger size packagings of appropriate type and performance level under the conditions of 4.1.1.15.2.

4.1.1.15.2 Appropriate measures shall be taken to prevent excessive movement of the damaged or leaking packages within a salvage packaging. When the salvage packaging contains liquids, sufficient inert absorbent material shall be added to eliminate the presence of free liquid."

4.1.2 Replace this section with the following:

"4.1.2 Additional general provisions for the use of IBCs

4.1.2.1 When IBCs are used for the transport of liquids with a flash point of 60.5 °C (closed cup) or lower, or of powders liable to dust explosion, measures shall be taken to prevent a dangerous electrostatic discharge.

4.1.2.2 The periodic testing and inspection requirements for IBCs are provided in Chapter 6.5. An IBC shall not be filled and offered for transport after the date of expiry of the last periodic test required by 6.5.4.14.3, or the date of expiry of the last periodic inspection required by 6.5.1.6.4. However, an IBC filled prior to the date of expiry of the last periodic test or inspection may be transported for a period not to exceed three months beyond the date of expiry of the last periodic test or inspection. In addition, an IBC may be transported after the date of expiry of the last periodic test or inspection:

- (a) After emptying but before cleaning, for purposes of performing the required test or inspection prior to refilling; and
- (b) Unless otherwise approved by the competent authority, for a period not to exceed six months beyond the date of expiry of the last periodic test or inspection in order to allow the return of dangerous goods or residues for proper disposal or recycling. Reference to this exemption shall be entered in the transport document.

4.1.2.3 For rigid plastics IBCs and composite IBCs with plastics inner receptacles, unless otherwise approved by the competent authority, the period of use permitted for the transport of dangerous liquids shall be five years from the date of manufacture of the receptacle except where a shorter period of use is prescribed because of the nature of the liquid to be transported.

4.1.2.4 IBCs of type 31HZ2 shall be filled to at least 80% of the volume of the outer casing and always be carried in closed transport units."

4.1.3.5 Amend to read as follows:

"4.1.3.5 Packagings, IBCs and large packagings shall conform to the requirements of Chapter 6.1, 6.5 or 6.6, respectively, and shall meet the test requirements of 6.1.5, 6.5.4 or 6.6.5, respectively, for packing group II, subject to 4.1.1.13, 6.1.2.4 and 6.5.1.4.4. Packagings meeting the test criteria of packing group I may be used. To avoid unnecessary confinement metal packagings of packing group I shall not be used."

4.1.3.19/
PI 112(c)

Add "5. For UN 0503 metal packagings shall not be used.", under the heading "PARTICULAR PACKING PROVISIONS OF EXCEPTIONS".

PI 130

Add "0501" at the end of the list of UN numbers, under the heading "PARTICULAR PACKING PROVISIONS OR EXCEPTIONS".

4.1.5.3/
PI 521

Replace "32%" by "52%" in the description of chemical name in the entry for "Di-tert-butyl peroxide".

Add the following new entry:

UN No	Organic peroxide	Type of IBC 1/	Maximum quantity (litres)	Control temperature 2/	Emergency temperature
3109	ORGANIC PEROXIDE, TYPE F, LIQUID tert-Butyl hydroperoxide, not more than 72% with water	31A	1250		

4.1.5.3/
PI 522

Replace "+25 °C" by "+20 °C" in the column headed "Emergency temperature" for the entry of "Dimyristyl peroxydicarbonate, not more than 42%, stable dispersion, in water".

Add the following new entries:

UN No	Organic peroxide	Type of IBC 1/	Maximum quantity (litres)	Control temperature 2/	Emergency temperature
3119	ORGANIC PEROXIDE, TYPE F, LIQUID, TEMPERATURE CONTROLLED				
	tert-Butyl peroxyneodecanoate, not more than 32% in diluent type A	31A	1250	0 °C	+ 10 °C
	tert-Butyl peroxyneodecanoate, not more than 42%, stable dispersion, in water	31A	1250	- 5 °C	+ 5 °C
	Di-(3,5,5-trimethylhexanoyl) peroxide, not more than 52%, stable dispersion, in water	31A	1250	+ 10 °C	+ 15 °C
	Cumyl peroxyneodecanoate, not more than 52%, stable dispersion, in water	31A	1250	- 15 °C	- 5 °C
	1,1,3,3-Tetramethylbutyl peroxyneodecanoate, not more than 52%, stable dispersion, in water	31A	1250	- 5 °C	+ 5 °C
	Di-(2-ethylhexyl) peroxydicarbonate, not more than 52%, stable dispersion, in water	31A	1250	- 20 °C	- 10 °C

4.1.6.5/

PI 620

Insert "other than for solid infectious substances," at the beginning of (a)(iii) under the heading "A packaging shall include:".

Chapter 4.2

4.2.1.13.8

Add ", or a combination of the two," after "types".

4.2.4.2.6/

T34

Under UN 3119:

Replace "+10 °C" by "+15 °C" in the column headed "Control temperature" and "+15 °C" by "+20 °C" in the column headed "Emergency temperature" for the entry "tert-Butyl peroxy-2-ethylhexanoate, not more than 32% in diluent type B".

Replace "-5 °C" by "+5 °C" in the column headed "Control temperature" and "+5 °C" by "+ 10 °C" in the column headed "Emergency temperature" for the entry "tert-Butyl peroxyvalate, not more than 27% in diluent type B".

Replace "-10 °C" by "0 °C" in the column headed "Control temperature" and "0 °C" by "+ 5 °C" in the column headed "Emergency temperature" for the entry "Di-(3,5,5-trimethylhexanoyl) peroxide, not more than 38% in diluent type A".

Chapter 5.4

5.4.1.2.2 Add ", with no additional information interspersed" at the end of the first sentence.

Chapter 6.1

6.1.1.4 Add the following new paragraph:

"6.1.1.4 Packagings shall be manufactured and tested under a quality assurance programme which satisfies the competent authority in order to ensure that each manufactured packaging meets the requirements of this Chapter."

6.1.2.7 In the table, under "1. Drums", insert at the end:

kind	Material	Category	Code	Paragraph
	N. Metal, other than steel or aluminium	non-removable head	N1	6.1.4.1
		removable head	N2	

6.1.4.1 Amend to read as follows:

"6.1.4.1 *Steel drums and drums of metals other than aluminium or steel*

- | | |
|-----|---|
| 1A1 | steel non-removable head |
| 1A2 | steel removable head |
| 1N1 | metal other than aluminium or steel, non-removable head |
| 1N2 | metal other than aluminium or steel, removable head" |

6.1.4.1.1 Replace "steel sheet" with "steel sheet (for 1A1 and 1A2) or sheet of metal other than steel or aluminium (for 1N1 and 1N2)".

6.1.4.1.5 Replace "(1A1)" and "(1A2)" by "(1A1 or 1N1)" and "(1A2 or 1N2)" respectively.

6.1.5.3.1 In the table, insert "Metal drums, other than steel or aluminium drums" under "Aluminium drums".

Chapter 6.5

6.5.1.2 Delete the definition of Liner.

6.5.1.4.1(a) Amend the heading of table as follows:

"For solids, loaded or discharged"

6.5.2.1.1 Amend the first sentence to read as follows:

"Each IBC manufactured and intended for use according to these Regulations shall bear markings which are durable, legible and placed in a location so as to be readily visible. Letters, numerals and symbols shall be at least 12 mm high and shall show:"

6.5.2.2.4 Amend to read as follows:

"6.5.2.2.4 Where a composite IBC is designed in such a manner that the outer casing is intended to be dismantled for transport when empty (such as for return of the IBC for reuse to the original consignor), each of the parts intended to be detached when so dismantled shall be marked with the month and year of manufacture and the name or symbol of the manufacturer and other identification of the IBC as specified by the competent authority (6.5.2.1.1(f))."

6.5.3.1.1(c) Delete the second sentence.

6.5.3.1.7 Replace "4.1.3.2" by "4.1.1.4".

6.5.4.8.4.2 Replace "4.1.2.2" by "4.1.1.4".

Chapter 6.6 (Renumbered as Chapter 6.7 - see ST/SG/AC.10/C.3/26/Add.2)

6.6.2.12.2 Replace the third sentence by the following:

"These devices may be fusible, spring-loaded or frangible disk components, or a combination of spring-loaded and frangible disk devices."

6.6.2.11 Add a new paragraph 6.6.2.11.2 to read as follows:

"6.6.2.11.2 Frangible disks shall be appropriate for the vacuum pressures which may be produced in the portable tank."

New Chapter 6.6 (Large packagings - see ST/SG/AC.10/C.3/26/Add.2)

6.6.1.2 Add the following new paragraph:

"6.6.1.2 Packagings shall be manufactured and tested under a quality assurance programme which satisfies the competent authority in order to ensure that each manufactured packaging meets the requirements of this Chapter."

Chapter 7.1

7.1.1.3 Add the following new paragraph:

"7.1.1.3 During transport, IBCs and large packagings shall be securely fixed or packed into the transport unit so as to prevent lateral or longitudinal movement or impact and so as to provide adequate external support."

7.1.4.3.1.2 Amend to read as follows:

"7.1.4.3.1.2 *Derivation of control and emergency temperatures*

Type of receptacle	SADT 1/	Control temperature	Emergency temperature
Single packagings and IBCs	20 °C or less over 20 °C to 35 °C over 35 °C	20 °C below SADT 15 °C below SADT 10 °C below SADT	10 °C below SADT 10 °C below SADT 5 °C below SADT
Portable tanks	< 50 °C	10 °C below SADT	5 °C below SADT

1/ i.e. the SADT of the substance as packaged for transport.

Appendix A and Index

1. Amend as appropriate Appendix A and the alphabetical index in accordance with the amendments adopted for Chapter 3.2.
2. Delete the following entry in the alphabetical index:
"Engine starting fluid with flammable gas, see 2.1 1950 "

Appendix B

GLOSSARY OF TERMS

Add the following new entry:

"AIR BAG INFLATORS, PYROTECHNIC or AIR BAG MODULES, PYROTECHNIC or SEAT-BELT PRETENSIONERS, PYROTECHNIC

Articles which contain pyrotechnical substances and are used as life-saving vehicle air bags or seat-belts."

2. **DRAFT AMENDMENTS TO THE MANUAL OF TESTS AND CRITERIA**
ST/SG/AC.10/11/Rev.2

Section 11

11.5.1.2.2 Amend to read as follows:

"11.5.1.2.2 Heating is provided by propane, from an industrial cylinder fitted with pressure regulator, via a flow meter and distributed by a manifold to the four burners. Other fuel gases may be used provided the specified heating rate is obtained. The gas pressure is regulated to give a heating rate of 3.3 ± 0.3 K/s when measured by the calibration procedure. Calibration involves heating a tube (fitted with a 1.5 mm orifice plate) filled with 27 cm³ of dibutyl phthalate. The time taken for the temperature of the liquid (measured with a 1 mm diameter thermocouple centrally placed 43 mm below the rim of the tube) to rise from 135 °C to 285 °C is recorded and the heating rate calculated."

Section 12

12.5.1.2.2 Amend to read as follows:

"12.5.1.2.2 Heating is provided by propane, from an industrial cylinder fitted with pressure regulator, via a flow meter and distributed by a manifold to the four burners. Other fuel gases may be used provided the specified heating rate is obtained. The gas pressure is regulated to give a heating rate of 3.3 ± 0.3 K/s when measured by the calibration procedure. Calibration involves heating a tube (fitted with a 1.5 mm orifice plate) filled with 27 cm³ of dibutyl phthalate. The time taken for the temperature of the liquid (measured with a 1 mm diameter thermocouple centrally placed 43 mm below the rim of the tube) to rise from 135 °C to 285 °C is recorded and the heating rate calculated."

Section 16

16.6 Replace with the following:

" 16.6 Series 6 type (c) test prescription

16.1.1 *Test 6 (c): External fire (bonfire) test*

16.6.1.1 *Introduction*

This is a test performed on packages of an explosive substance or explosive articles, or unpackaged explosive articles, to determine whether there is a mass explosion or a hazard from dangerous projections, radiant heat and/or violent burning or any other dangerous effect when involved in a fire.

16.6.1.2 *Apparatus and materials*

The following items are needed:

- (a) If the volume of the package of substance or articles, or unpackaged article, is less than 0.05 m^3 , sufficient packages or unpackaged articles to give a total volume of not less than 0.15 m^3 .
- (b) If the volume of the package of substance or articles, or unpackaged article, is equal to or greater than 0.05 m^3 , three packages or unpackaged articles. If the volume of one package or unpackaged article is greater than 0.15 m^3 , the competent authority may waive the requirement for three packages or unpackaged articles to be tested.
- (c) A metal grid to support the products above the fuel and allow adequate heating. If a wooden crib fire is used, the grid should be 1.0 m above the ground and if a liquid hydrocarbon pool fire is used then the grid should be 0.5 m above the ground.
- (d) Strapping or wire, if necessary, to hold the packages or unpackaged articles together on the support grid.
- (e) Enough fuel to keep a fire burning for at least 30 minutes or, if necessary, until the substance or article has clearly had sufficient time to react to the fire (see 16.6.1.3.8).
- (f) Suitable means of ignition to ignite the fuel on at least two sides e.g. for a wood fire, kerosene to soak the wood and pyrotechnic igniters with wood wool.
- (g) Three $2000 \text{ mm} \times 2000 \text{ mm} \times 2 \text{ mm}$ 1100-0 aluminium sheets (Brinell Hardness 23, tensile strength 90 megapascals), or equivalent, to act as witness screens together with suitable supports to hold them vertically. The witness screens shall be mounted rigidly to their frames. When more than one panel is used to make a witness screen, each panel shall be supported at all joints.
- (h) Cine or video cameras, preferably high speed and normal speed, to record events in colour.

Blast gauges, radiometers and associated recording equipment may also be used.

16.6.1.3 Procedure

16.6.1.3.1 The required number of packages or unpackaged articles, in the condition and form in which they are offered for transport, are arranged as close as possible to one another on the metal grid. Packages should be oriented in such a way that a maximum probability for projections hitting the witness screens is obtained. If necessary, the packages or unpackaged articles may be encircled with a steel strip to support them during the test. Fuel is placed beneath the grid so that the fire will engulf the packages or unpackaged articles. Precautions against side winds may be required to avoid dissipation of the heat. Suitable methods of heating include a wood fire using a lattice of wooden laths, a liquid or gas fuel fire, that produces a flame temperature of at least 800°C .

16.6.1.3.2 One method is to use a wood fire which has a balanced air/fuel ratio, thereby avoiding too much smoke which would obscure the events, and which burns with sufficient intensity and duration to bring many kinds of packaged explosives to reaction in 10 to 30 minutes. A suitable method involves using air-dried pieces of wood (approximately 50 mm square section), stacked to form a lattice beneath the grid (1 m off the ground), and up to the base of the grid supporting the packages or unpackaged articles. The wood should extend beyond the packages or unpackaged articles to a distance of at least 1.0 m in every direction and the lateral distance between the laths should be about 100 mm.

16.6.1.3.3 A receptacle filled with suitable liquid fuel, a combination of both wood and liquid fuel fire may be used as an alternative to the wood fire providing it is as severe. If a liquid pool fire is used, the receptacle should extend beyond the packages or unpackaged articles to a distance of at least 1.0 m in every direction. The distance between the grid platform and the receptacle should be approximately 0.5 m. Before using this method, consideration should be given to whether any quenching action or adverse interaction between explosives and liquid fuel can occur such as might bring the results into question.

16.6.1.3.4 If gas is to be used as a fuel, the burning area must extend beyond the packages or unpackaged articles to a distance of at least 1.0 m in every direction. The gas must be supplied in such a manner to ensure that the fire is evenly distributed around the packages. The gas reservoir should be large enough to keep the fire burning for at least 30 minutes. Ignition of the gas may be accomplished either by remotely ignited pyrotechnics or by remote release of the gas adjacent to a pre-existing source of ignition.

16.6.1.3.5 The vertical witness screens are erected in each of three quadrants at a distance of 4 m from the edge of the packages or unpackaged articles. The downwind quadrant is not used for screens because prolonged exposure to flames may change the resistance of the aluminium sheets to projections. The sheets should be placed so that the centres are level with the centre of the packages or unpackaged articles or, if this is less than 1.0 m above the ground, in contact with the ground. If there are any perforations or indentations in the witness screens before the test, they should be marked so that they can be clearly distinguished from those created during the test.

16.6.1.3.6 The ignition system should be put into place and the fuel ignited on two sides, one the upwind side, simultaneously. The test should not be performed under conditions where the wind speed exceeds 6 m/s. *A safe waiting period, prescribed by the test agency, should be observed after the fire has extinguished.*

16.6.1.3.7 Observations are made on the following:

- (a) Evidence of explosion;
- (b) Potentially hazardous projections; and
- (c) Thermal effects.

16.6.1.3.8 The test is normally performed once only but if the wood or other fuel used for the fire is all consumed leaving a significant quantity of unconsumed explosive substance in the remains or in the vicinity of the fire, then the test should be performed again using more fuel, or a different method, to increase the intensity and/or duration of the fire. If the result of the test does not enable the hazard division to be determined, a further test should be performed.

16.6.1.4 *Test criteria and method of assessing results*

16.6.1.4.1 The following criteria are used to answer the questions in figure 10.3 (boxes 26, 28, 30, 32, 33, 35 and 36) in order to assess the results and classify the product.

16.6.1.4.2 If mass explosion occurs then the product is assigned to Division 1.1. A mass explosion is considered to occur if a substantial proportion explodes so that the practical hazard should be assessed by assuming simultaneous explosion of the whole of the explosive content of the packages or unpackaged articles.

16.6.1.4.3 If a mass explosion does not occur but any one of the following occurs:

- (a) A perforation of any of the witness screens (see 16.6.1.3.5);
- (b) A metallic projection with a kinetic energy exceeding 20 J as assessed by the distance - mass relation given in Figure 16.6.1.1;

then the product is assigned to Division 1.2.

16.6.1.4.4 If none of the events occur which would require the product to be assigned to Division 1.1 or 1.2 but any one of the following events occurs:

- (a) A fireball or jet of flame which extends beyond any of the witness screens;
- (b) A fiery projection emanating from the product is thrown more than 15 m from the edge of the packages or unpackaged articles;
- (c) A burning time of the product measured to be less than 35 seconds for 100 kg net explosive mass (see 16.6.1.4.8 Notes for scaling time measurements in evaluating thermal flux effects). Alternatively, in the case of articles and low energy substances, the irradiance of the burning product exceeds that of the fire by more than 4 kW/m² at a distance of 15 m from the edge of the packages or unpackaged articles. The irradiance is measured over 5 seconds, during the period of maximum output;

then the product is assigned to Division 1.3.

16.6.1.4.5 If none of the events occur which would require the product to be assigned to Division 1.1, 1.2 or 1.3, but any one of the following events occurs:

- (a) A fireball or jet of flame which extends more than 1 m from the flames of the fire;
- (b) A fiery projection emanating from the product is thrown more than 5 m from the edge of the packages or unpackaged articles;
- (c) An indentation in any of the witness screens of more than 4 mm;
- (d) A metallic projection with a kinetic energy exceeding 8 J as assessed by the distance - mass relation given in Figure 16.6.1.1;
- (e) a burning time of the product measured to be less than 330 seconds for 100 kg net explosive mass (see 16.6.1.4.8: Notes for scaling time measurements in evaluating thermal flux effects);

then the product is assigned to Division 1.4 and to a compatibility group other than Compatibility Group S.

16.6.1.4.6 If none of the events occur which would require the product to be assigned to Division 1.1, 1.2, 1.3 or 1.4 other than Compatibility Group S, the thermal, blast, or projection effects would not significantly hinder fire-fighting or other emergency response efforts in the immediate vicinity, then the product is assigned to Division 1.4 Compatibility Group S.

16.6.1.4.7 If there are no hazardous effects at all, the product is considered for exclusion from Class 1. The possibilities, as shown by boxes 35 and 36 in figure 10.3, are:

- (a) If the product is an article manufactured with a view to producing a practical explosive or pyrotechnic effect, then:
 - (i) if there is some effect (projection, fire, smoke, heat or loud noise) external to the device itself, the device is not excluded from Class 1 and the product, as packaged, is assigned to Division 1.4 and to Compatibility Group S. Paragraph 2.1.1.1 (b) of the Model Regulations refers explicitly to the device, rather than the package, so it is usually necessary to make this assessment on the basis of a test involving functioning of the device without packaging or confinement. Sometimes the stated effects are observed in test 6 (c), in which case the product is classified 1.4 S without further tests;
 - (ii) if there is no effect (projection, fire, smoke, heat or loud noise) external to the device itself, the unpackaged device is excluded from Class 1 in accordance with paragraph 2.1.1.1 (b) of the Model Regulations. Paragraph 2.1.1.1 (b) of the Model Regulations refers explicitly to the device, rather than the package, so it is usually necessary to make this assessment on the basis of a test involving functioning of the device without packaging or confinement.

- (b) If the product is not manufactured with a view to producing a practical explosive or pyrotechnic effect, it is excluded from Class 1 in accordance with paragraph 2.1.1.1 of the Model Regulations.

16.6.1.4.8 Notes for scaling time measurements in evaluating thermal flux effects

Notes:

- 1) The value of 35 seconds/100 kg (see 16.6.1.4.4(c)) correlates to an average thermal flux of 4 kW/m² at 15 m and is based on an assumed heat of combustion of 12500 J/g. If the true heat of combustion is significantly different, the burning time of 35 sec may be corrected; for example, a true heat of combustion of 8372 J/g burning for $(8372/12500) \times 35 \text{ s} = 23.4 \text{ s}$ would produce the same flux level. Corrections for masses other than 100 kg are made according to the scaling relations and examples in Table 16.2.
- 2) The value of 330 seconds/100 kg (see 16.6.1.4.5(e)) correlates to an average thermal flux of 4 kW/m² at 5 m and is based on an assumed heat of combustion of 12500 J/g. If the true heat of combustion is significantly different, the burning time of 330 sec may be corrected; for example, a true heat of combustion of 8372 J/g burning for $(8372/12500) \times 330 \text{ s} = 221 \text{ s}$ would produce the same flux level. Corrections for masses other than 100 kg are made according to the scaling relations and examples in Table 16.2.
- 3) In some burn time trials, individual packages or articles will be observed to burn in separate, identifiable events; in such cases, the burning times and masses of each separate event should be used.

Mass (kg)	1.3/1.4		1.4/1.4S	
	Flux (15 m)	Burn time (s)	Flux (5 m)	Burn time (s)
20	1.36 kW/m ²	21.7	1.36 kW/m ²	195
50	2.5	29.6	2.5	266
100	4	35	4	330
200	6.3	46.3	6.3	419
500	11.7	63.3	11.7	569

Table 16.2
Comparative Thermal Flux Values for Varying Masses

*Note: Thermal flux is scaled on basis of $(m/m_0)^{2/3}$.
Times are scaled on basis of $(m/m_0)^{1/3}$.*

The values of thermal flux can be calculated from the equation:

$$F = \frac{C \cdot E}{4\pi R^2 t}$$

where:

F = thermal flux in kW/m²,

C = constant = 0.33,

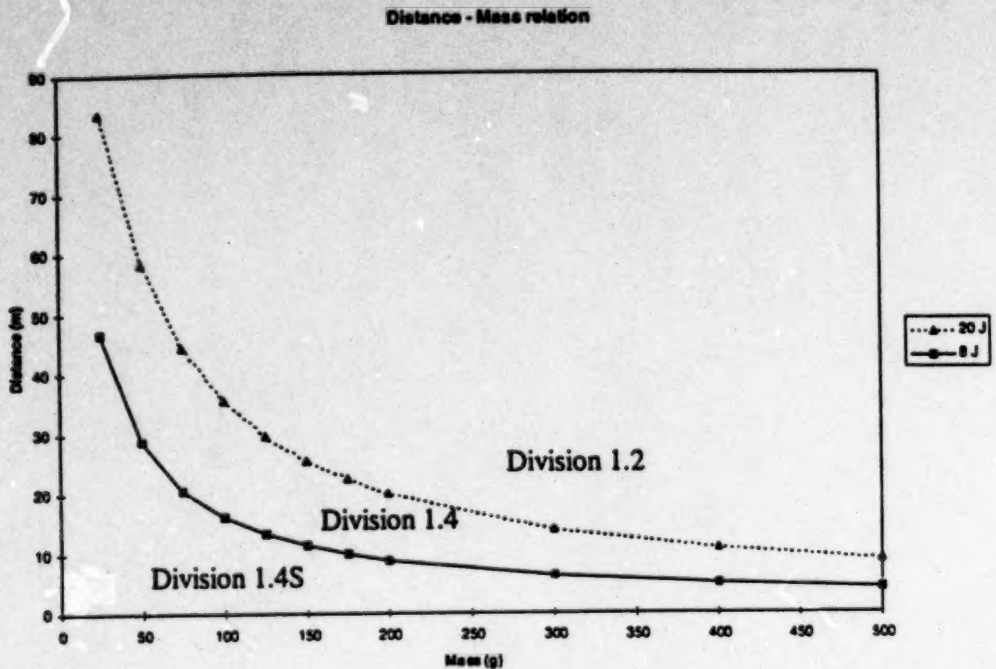
E = total energy content in joules,

R = distance from fire to exposed position in meters,

t = observed burn time in seconds.

16.6.1.5 *Examples of results*

Substance	Packaging	Events	Result
Musk xylene	3 x 50 kg fibreboard drums	Slow burning; only	Not Class 1



Mass	Projection distance (m)	
(g)	20 J	8 J
25	83.6	46.8
50	58.4	28.7
75	44.4	20.6
100	35.6	16.2
125	29.8	13.3
150	25.6	11.4
175	22.43	10
200	20	8.8
300	13.9	6.3
400	10.9	4.9
500	8.9	4.1

Example data for metallic projections with a kinetic energy of 20 J and 8 J

FIGURE 16.6.1.1: Distance-mass Relation for Metallic Projections with a kinetic energy of 20 J and 8 J ^{1/}

^{1/} The data presented in Figure 16.6.1.1 is based upon metallic projections. Non-metallic projections will produce different results and may be hazardous. Hazards from non-metallic projections should also be considered.

Section 25

25.4.1.2.2 Amend to read as follows:

"25.4.1.2.2 Heating is provided by propane, from an industrial cylinder fitted with pressure regulator, via a flow meter and distributed by a manifold to the four burners. Other fuel gases may be used provided the specified heating rate is obtained. The gas pressure is regulated to give a heating rate of 3.3 ± 0.3 K/s when measured by the calibration procedure. Calibration involves heating a tube (fitted with a 1.5 mm orifice plate) filled with 27 cm³ of dibutyl phthalate. The time taken for the temperature of the liquid (measured with a 1 mm diameter thermocouple centrally placed 43 mm below the rim of the tube) to rise from 135 °C to 285 °C is recorded and the heating rate calculated."

Section 28

28.2.3/Table 28.2 Amend to read as follows:

"Table 28.2: DERIVATION OF CONTROL AND EMERGENCY TEMPERATURES

Type of receptacle	SADT 1/	Control temperature	Emergency temperature
Single packagings and IBCs	20 °C or less over 20 °C to 35 °C over 35 °C	20 °C below SADT 15 °C below SADT 10 °C below SADT	10 °C below SADT 10 °C below SADT 5 °C below SADT
Portable tanks	< 50 °C	10 °C below SADT	5 °C below SADT

1/ i.e. the SADT of the substance as packaged for transport"

Section 38

38.3.3.2 Add the following new definitions in appropriate alphabetical order:

"Large battery means a battery in which the aggregate lithium content of all anodes, when fully charged, is more than 500 g."

"Large cell means a cell in which the lithium content of the anode, when fully charged, is more than 12 g."

"Small battery means a battery composed of small cells, and in which the aggregate lithium content of all cell anodes, when fully charged, is not more than 500 g."

"Small cell means a cell in which the lithium content of the anode, when fully charged, is not more than 12 g."

38.3.4.1.2.2 Amend the first sentence to read as follows:

"For small cells and small batteries, the number and condition of cells and batteries to be tested are as follows:" [(a) to (f) unchanged].

38.3.4.1.2.3 Add the following new paragraph:

"38.3.4.1.2.3 For large cells and large batteries, the number and condition of cells and batteries to be tested are as follows:

- (a) Only when cells are to be transported individually:
 - (i) Ten cells which should be tested, at first cycle, in both fully charged and fully discharged states; and
 - (ii) Ten cells which should be tested after deep cycling a minimum of 50 times, in both fully charged and fully discharged states.
- (b) Four batteries, which should be tested, at first cycle, in both fully charged and fully discharged states.
- (c) Four batteries, which should be tested after deep cycling a minimum of 50 times, in both fully charged state and fully discharged states."

38.3.4.1.3.2 Replace "5 minutes" by "10 minutes" in the second sentence.

38.3.4.2.2.1 Amend the second sentence to read as follows:

"The shock test apparatus should be constructed to give the minimum accelerations required by 38.2.3.2.3.2 for the size of cell or battery being tested, e.g., apparatus to IEC 68-2-27."

38.3.4.2.2.2 Amend the first sentence to read as follows:

"For small cells and small batteries, the number and condition of cells and batteries to be tested are as follows:" [(a) to (f) unchanged].

38.3.4.2.2.3 Add a new paragraph to read as follows:

"38.3.4.2.2.3 For large cells and large batteries, the number and condition of cells and batteries to be tested are as follows:

- (a) Only when cells are to be transported individually:
 - (i) Ten cells which should be tested, at first cycle, in both fully charged and fully discharged states; and

(ii) Ten cells which should be tested after deep cycling a minimum of 50 times, in both fully charged and fully discharged states.

(b) Four batteries, which should be tested, at first cycle, in both fully charged and fully discharged states.

(c) Four batteries, which should be tested after deep cycling a minimum of 50 times, in both fully charged state and fully discharged states."

38.3.4.2.3.2 Replace the last two sentences with the following:

"In each case, the cell or battery is accelerated in such a manner that:

(a) For small cells and small batteries, during the first three milliseconds the minimum average acceleration is 75 times the local acceleration due to gravity, and the peak acceleration is between 125 and 175 times the local acceleration of gravity; or

(b) For large cells and large batteries, a peak acceleration of not less than 50 times the local acceleration of gravity is achieved over a maximum duration of 11 milliseconds."

38.3.4.3.2.1 Amend the second sentence to read as follows:

"The shock test apparatus should be constructed to give the minimum accelerations required by 38.2.3.2.3.2 for the size of cell or battery being tested, e.g., apparatus to IEC 68-2-27."

38.3.4.3.2.2 Amend to read as follows:

"38.3.4.3.2.2 For small cells and small batteries, the number and condition of cells and batteries to be tested are as follows:"

38.3.4.3.2.3 Add the following new paragraph:

"38.3.4.3.2.3 For large cells and large batteries, tests need not be performed on batteries, and the number and condition of cells to be tested are as follows:

(a) Ten cells which should be tested, at first cycle, in the fully charged state; and

(b) Ten cells which should be tested after deep cycling a minimum of 50 times, in the fully charged state."

38.3.4.3.3.2 Replace the last two sentences with the following:

"In each case, the cell or battery is accelerated in such a manner that:

- (a) For small cells and small batteries, during the first three milliseconds the minimum average acceleration is 75 times the local acceleration due to gravity, and the peak acceleration is between 125 and 175 times the local acceleration of gravity; or
- (b) For large cells, a peak acceleration of not less than 50 times the local acceleration of gravity is achieved over a maximum duration of 11 milliseconds."

38.3.4.3.3 In the fifth sentence, add "continuous" after "maximum" and insert the following new sixth sentence:

"When for large cells this average current draw cannot be achieved employing this test procedure, the current draw required is the maximum current attainable according to this test procedure at the ambient temperature at which the test is performed."

38.3.4.4.2.1 Replace "a 6 mm (diameter) rod" with "a rod with a diameter of at least 50% of the smallest cell overall dimension, or 6 mm, whichever is greater".

38.3.4.4.2.2 Transfer the first two sentences to the end of 38.3.4.4.1 and amend the third sentence to read as follows:

"For small cells, the number and condition of cells to be tested are as follows:" [(a) to (d) unchanged].

38.3.4.4.2.3 Add the following new paragraph:

"38.3.4.4.2.3 For large cells, ten cells should be tested, at first cycle, in the fully charged state."

Renumber the existing paragraphs consequently.

38.3.4.4.3 Amend to read as follows:

"38.3.4.4.3 Each cell is deformed until the open circuit voltage drops abruptly or is reduced to at least one third [, or until a maximum force of 10 kN is applied]. The deformation is effected by placing the rod between one jaw of the clamping device and the cell and applying force. In the case of prismatic cells, the force is to be applied to each face that is perpendicular to the terminal face. The applied force is removed at the point at which the cell voltage drops [, or when the maximum 10 kN force is achieved, whichever occurs first]."

38.3.4.5.2.1 Amend the second sentence to read as follows:

"The shock test apparatus should be constructed to give the minimum accelerations required by 38.2.3.5.3.2 for the size of cell or battery being tested, e.g., apparatus to IEC 68-2-27."

38.3.4.5.2.2 Amend the first sentence to read as follows:

"For small cells and small batteries, the number and condition of cells and batteries to be tested are as follows:" [(a) and (b) unchanged].

38.3.4.5.2.3 Add the following new paragraph:

"For large cells and large batteries, batteries should be constructed with uncycled cells except for one in each series string which is deep cycled a minimum of 50 times, and then brought to a 60 % state of charge. Four batteries are tested at first cycle in the fully charged state."

38.3.4.5.3.2 Replace the last two sentences with the following:

"In each case, the cell or battery is accelerated in such a manner that:

- (a) For small cells and small batteries, during the first three milliseconds the minimum average acceleration is 75 times the local acceleration due to gravity, and the peak acceleration is between 125 and 175 times the local acceleration of gravity; or
- (b) For large cells and large batteries, a peak acceleration of not less than 50 times the local acceleration of gravity is achieved over a maximum duration of 11 milliseconds."

38.3.4.5.3.3 Insert before the last sentence the following new sentence:

"When for large batteries this average current draw cannot be achieved employing this test procedure, the current draw required is the maximum current attainable according to this test procedure at the ambient temperature at which the test is performed."

38.3.4.6.2.2 Amend the first sentence to read as follows:

"For small cells and small batteries, the number and condition of cells and batteries to be tested are as follows:"

38.3.4.6.2.3 Add the following new paragraph to read as follows:

"38.3.4.6.2.3 For large cells and large batteries, tests need not be performed on batteries, and need only be performed on component cells when the battery voltage does not exceed 12 volts. When required to be tested, the number and condition of cells to be tested are as follows:

- (a) Ten cells which should be tested, at first cycle, in the fully discharged state.
- (b) Ten cells which should be tested, after deep cycling a minimum of 50 times, in the fully discharged state."

38.3.4.6.3 Insert after the sixth sentence, the following new sentence:

"When for large cells this average current draw cannot be achieved employing this test procedure, the current draw required is the maximum current attainable according to this test procedure at the ambient temperature at which the test is performed."

38.3.4.7.2 Replace "subject to the mass requirements in Special Provision 230," with "not excepted from the Model Regulations according to 38.3.4.7.1,".
